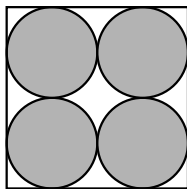


College of Charleston
Math Meet 2006
Written Test – Level 1

1. If $x < |x|$ and $x^2 + 2x - 3 = 0$, then $2x + 4 =$
(A) -3 (B) -2 (C) 2
(D) 6 (E) none of these
2. A container weighs 160 pounds plus half of its weight. How many pounds does the container weigh?
(A) 200 (B) 240 (C) 320
(D) 480 (E) none of these
3. A picture was made on a copy machine. The copier had been set for a reduction to 80% of the original size. What percent will need to be used on the copier to obtain a full size copy from the reduced sized picture?
(A) 20% (B) 80% (C) 120%
(D) 125% (E) none of these
4. If $x\mathcal{L}y$ is defined as the smallest integer of which both x and y are factors, then $10\mathcal{L}32$ is how much greater than $6\mathcal{L}20$?
(A) 70 (B) 100 (C) 160
(D) 200 (E) none of these
5. Circle C_1 has radius 2 and is centered at the point $(0, 0)$. Circle C_2 has radius 2 and is centered at the point $(0, 2)$. Find the distance between the points of intersection of C_1 and C_2 .
(A) $\sqrt{3}$ (B) $2\sqrt{3}$ (C) $2\sqrt{2}$
(D) $3\sqrt{2}$ (E) None of these
6. How many integers k are there so that $x^2 + kx + 12$ can be factored in the form $(x + a)(x + b)$ where a and b are integers?
(A) 2 (B) 4 (C) 5
(D) 6 (E) none of these
7. What is the minimum number of students that will ensure that at least five of the students will be males or at least five of the students will be females?
(A) 5 (B) 6 (C) 9
(D) 10 (E) none of these
8. A line through the point $(-4, 1/2)$ and perpendicular to $x - 2y + 10 = 0$ has equation $2X + BY + C = 0$. The value of C is
(A) -8.5 (B) -5 (C) 5
(D) 7.5 (E) none of these

9. Factor $x^2 + 2ax + a^2 - bx - ba - cx - ca$ completely. *One* of the factors is:
 (A) $x - a$ (B) $x - a - b - c$
 (C) $x + a - b - c$ (D) $x + a + b + c$
 (E) $x + b$
10. A commuter train currently carries 600 passengers from a suburb to a city. It now costs 1 dollar per passenger to ride the train. A study shows that 50 additional people will ride the train for each 5 cent reduction in fare. What fare should be charged to maximize revenue?
 (A) 95 cents (B) 90 cents (C) 85 cents
 (D) 80 cents (E) 75 cents
11. The line segment joining the points (0,120) and (200,0) contains how many points having both coordinates as integers?
 (A) 20 (B) 31 (C) 40
 (D) 41 (E) none of these
12. A rectangular aquarium tank has width x feet, height twice its width, and length y feet. The glass for the sides and ends costs \$3 per square foot but the material for the base only costs \$2 per square foot. There is no top. Find an expression for the total cost of the materials to make the tank.
 (A) $14xy + 12x^2$ (B) $5xy + 4x^2$ (C) $12x + 4y$
 (D) $34x + 10y$ (E) $8xy + 6x^2$
13. Suppose that a die is rolled twice. What is the probability that on the first roll you get an even number x and then on the second roll you get either $x - 1$ or $x + 1$?
 (A) $1/36$ (B) $4/36$ (C) $5/36$
 (D) $6/36$ (E) none of these
14. Find all real solutions of $8^{(x^2-x)/3} = 4^{x-1}$. Add the solutions together. The result is:
 (A) -2 (B) 2 (C) 3
 (D) 5 (E) None of these
15. The solutions to the equation $x^3 + 4x^2 + x - 2 = 0$ are -1 , A , and B . The value of $A^2 + B^2$ is
 (A) -5 (B) 6 (C) 13
 (D) 25 (E) none of these
16. There are two five digit numbers in the form $19a9b$ that are divisible by 36. Find the sum $a + b$.
 (A) 8 (B) 12 (C) 13
 (D) 15 (E) none of these

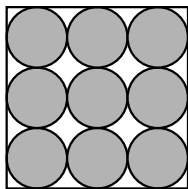
17. A company has 6,000 employees. Almost everyone of the employees reads a local newspaper on a regular basis. The company town has three local newspapers, *The Post*, *The Courier*, and *The Daily News*. Seventy percent of the employees read *The Post*, forty-five percent read *The Courier*, and sixty percent read *The Daily News*. One-fourth of the employees read *The Post* and *The Courier*, thirty percent read *The Daily News* and *The Courier*, and thirty-five percent read *The Post* and *The Daily News*. One tenth of the people read all three papers on a regular basis. How many of these employees read none of the three local papers on a regular basis?
- (A) 0 (B) 150 (C) 300
(D) 450 (E) none of these
18. A gift box of chocolates contains nine pieces with caramel filling, eleven pieces with mint filling, and three pieces with cherry filling. How many chocolate pieces need to be taken out of the box in order to be certain to get at least three chocolate pieces with mint filling?
- (A) 8 (B) 13 (C) 14
(D) 15 (E) none of these
19. The distance between the x -intercept and the y -intercept of the line $2y = 6 - x$ is
- (A) between 4 and 5 (B) between 5 and 6
(C) between 6 and 7 (D) between 7 and 8
(E) none of these
20. Line l passes through the origin and point (a, b) . If the product of a and b is not equal to zero and line l has a slope greater than 1, then which of the following must be true?
- (A) $a = b$ (B) $a < b$ (C) $a + b > 0$
(D) $a^2 < b^2$ (E) none of these
21. A square, each side 4 units long, is packed with n adjacent rows of n adjacent congruent circles. (See figure.) What is the total area, in square units, of all of the circles inside the square?



$n = 2$

(A) $2n\pi$

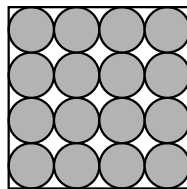
(D) 4π



$n = 3$

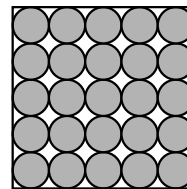
(B) $2\pi/n^2$

(E) none of these



$n = 4$

(C) 2π



$n = 5$

22. How many three digit numbers abc between 100 and 600, fit the formula $a+b=c$, where the sum of the first two digits equals the last digit?
- (A) 25 (B) 35 (C) 45
(D) 55 (E) none of these

23. The numerator of a fraction is $a6bc$ and the denominator of this fraction is $de3fg$, where a, b, c, d, e, f, g , are unique digits. The numerator and the denominator consist of all of the digits 1,2,3,4,5,6,7,8, and 9. If the value of the fraction is one-half, what must be the value of digit e ?
- (A) 5 (B) 7 (C) 8
(D) 9 (E) none of these
24. A regular drinking cup has a height of 10 centimeters, a circular base with diameter 8 centimeters, and a circular lip with diameter 12 centimeters. What is the volume of the cup in cubic centimeters?
- (A) $320\pi/3$ (B) $760\pi/3$ (C) $1080\pi/3$
(D) $1400\pi/3$ (E) none of these
25. A two digit integer is x times the sum of its digits. The integer formed by reversing the digits of the original number is the sum of the digits of the original number multiplied by what?
- (A) x (B) $11 - x$ (C) $9 - 2x$
(D) $1/x$ (E) none of these

2006 Answers / Level 1 Test

1. B
2. C
3. D
4. B
5. B
6. D
7. C
8. D
9. C
10. D
11. D
12. A
13. C
14. C
15. C
16. A
17. C
18. D
19. C
20. D
21. D
22. B
23. A
24. B
25. B